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ABSTRACT

This research project investigates teachers' ideas of the values that they teach in their mathematics lessons. In most cases, they are unaware of these values, or indeed that they actually are teaching values. Part of the problem seems to be the lack of reference to any values teaching by either intended curricula documents or textual materials. As well as giving the teachers a vocabulary with which to articulate the values in their teaching, this research also points out the need for more explicit elaboration of values in the various documents that support and/or shape teacher activities. In that sense, the research project demonstrates that there is a gap between research and practice to do essentially with "intention" or, more generally, "policy." (Contains 13 references.) (Author/KHR)

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Research, Policy and Practice: The Case of Values

by
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Research, policy and practice: The case of values

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A current research project is investigating teachers' ideas about the values that they are teaching in their mathematics lessons. In most cases they are unaware of these values, or indeed that they actually are teaching values. Part of the problem seems to be the lack of reference to any values teaching by either intended curricula documents or textual materials. As well as giving the teachers a vocabulary with which to articulate the values in their teaching, the research is also pointing to the need for more explicit elaboration of values in the various documents that support and/or shape teachers' activities. In that sense, the research project is demonstrating that there is a gap between research and practice to do essentially with 'intention' or, more generally, 'policy'.

Introduction

Underpinning any discussion about social justice and democratisation in mathematics education lies the issue of 'values'. This is problematic at the present time because we neither know what currently happens with values teaching in mathematics classrooms, or why, nor do we have any idea how potentially controllable such values teaching is by teachers. In addition, many mathematics teachers are not even aware that they are teaching any values when they teach mathematics. Changing that perception may prove to be one of the biggest hurdles to be overcome if we are to move to a more just mathematics education.

Values in mathematics education are deep affective qualities which mathematics teaching fosters (Bishop, 1991) and they are a crucial component of the mathematics classroom affective environment. In our project we accept that values, beliefs, and attitudes are dialectically related (see Krathwohl, Bloom, & Masia, 1964; McLeod, 1992; Raths, Harmin, & Simon, 1987). However, our concern is with the values of mathematics and mathematics education rather than with more general values such as social, ecological, moral and so forth - although these may well influence teachers' personal value systems. For example, the teachers in our project talk about valuing cooperation in problem solving, individual differences, taking risks in finding solutions, being logical, creativity etc.

As Bishop, Clarkson, FitzSimons and Seah (1999) note, there is relatively little knowledge about what values teachers are teaching in mathematics classes, about how aware teachers are of their own value positions, about how these affect their teaching, and about how their teaching thereby develops certain values in their students. Values are rarely considered in any discussions about mathematics teaching, and a casual question to teachers about the values they are teaching in mathematics lessons often produces an answer to the effect that they don't believe they are teaching any values at all.

P. Valero & O. Skovsmose (2002) (Eds.). Proceedings of the 3rd International MES Conference. Copenhagen: Centre for Research in Learning Mathematics, pp. 1-7

It is a widespread misunderstanding that mathematics is the most value-free of all school subjects, not just among teachers but also among parents, university mathematicians and employers. In reality, mathematics is just as much human and cultural knowledge as is any other field of knowledge; teachers inevitably teach values, and adults certainly express feelings, beliefs and values about mathematics which clearly relate to the mathematics teaching they experienced at school (FitzSimons, 1994).

The research project

This project, in which I am collaborating with Gail FitzSimons, Phil Clarkson, and Wee Tiong Seah, relies on working with, rather than on, teachers. Initially we talked about values with groups of teachers, using video-clips and written classroom incidents as prompts, in professional development settings. From among the teachers who attended these sessions, and from others who completed a circulated questionnaire, we established a small group of 8 volunteer teachers, in both primary and secondary schools who were willing to work with us in their classrooms.

The basic approach adopted with each teacher was a cycle of preliminary interview, classroom observation, and post-observation debriefing interview. This cycle was repeated on two or three days. The classroom observations were video-taped, and the interviews audio-taped. This process not only invited teachers to reflect on their teaching practices and to say what values they were intending to teach. It also asked for authentication of the teacher's analysis by seeking to observe those values being implemented in the classroom situation, with activities devised by the teacher.

Using this strategy we studied the extent to which the teachers were controlling their values teaching. In particular we were interested in whether they could articulate their own intended values, and whether they then implemented these in their classrooms. Before each observation lesson, the teacher presented the observer with a brief lesson plan including the flow of content and the teaching strategies, and also nominated the values they were intending to teach in the lesson. During the observation lessons we looked specifically for those values being implemented, but also we looked for other values being portrayed by the teacher.

We transcribed and analysed the audio-tapes, but the video-tapes were only used to stimulate discussion with the teacher. In some post-observation interviews the video-tapes became the key memory prompting device for the teacher, who then was able to elaborate on values-related episodes for the researcher. The researcher had also noted points at which both explicit and implicit values teaching seemed to be occurring, and the use of the video-tape helped them both to recall the detail of these episodes. The aim of the post-observation interview was for the teacher and researcher to come to a shared agreement on some particular examples of when and how values teaching occurred in a particular lesson.

Our research in Victorian school classrooms has indicated a range of scenarios. Teachers may or may not be aware of possible values arising from

the discipline of mathematics or the field of mathematics education that they portray in their classes. When they do make a conscious decision to portray a certain value, it may be addressed explicitly (e.g., "today we are going to focus on co-operation ..."), or implicitly (e.g., by rewarding co-operative behaviour without mentioning it explicitly). Even when they have expressed their intention to portray a nominated value, it sometimes happens that it is not observed by the researcher in the classroom. On the other hand, there are also often occasions where teachers portray values of which they themselves were unaware.

In analysing the data collected from the case studies of eight teachers, we were able to categorise whether teachers did, or did not, nominate the values that were subsequently observed (or sometimes not observed). Where teachers were observed to teach the nominated values, we categorised them as explicit or implicit. These are summarised in Table 1 with reference to five of the teachers.

		Implemented/Observed		
		Taught Explicitly	Taught Implicitly	Not Observed
Intended/ Nominated	Nominated Explicitly	*Co-operation* (Anna)	*Self-esteem* (Ben)	*Creativity* (Colin)
	Not nominated	Individual differences *(Diane)*	Inclusiveness *(Edward)*	–

Table 1: Categories of intended and implemented values observed

Anna, a primary school teacher, nominated the value of the children *working co-operatively* in small groups, and was observed to implement this value explicitly, discussing it and rewarding co-operative behaviour. In fact, she indicated that this was a value that ran across all her teaching of the Grade 1/2 classes in this suburban Catholic school. Ben, a secondary mathematics teacher, nominated explicitly that he would emphasise the value of student *self-worth/self-esteem*. Over the three lessons observed, it became evident that this value was often emphasised, although its portrayal was implicit in his behaviour; that is, Ben neither introduced nor discussed the value with the students. Rather, he gave his Year 11 male, independent-school, students plentiful opportunities to demonstrate to themselves (and to the class) that they could 'do it right.'

Colin, another secondary mathematics teacher from a large country town, nominated and personally embraced the value of *creativity* in doing mathematics. However, the promotion of this value was not observed during the researcher's visits to his Year 7 class. According to Colin, the reality of the class prevented him from portraying the value of *creativity*: few students normally responded to his invitation.

At times, values were not nominated by teachers but were subsequently observed. Transcripts of data reveal that sometimes teachers were aware of the underlying values but, to the extent that they had internalised them, they had not considered them worthy of mention.

Values and mathematics education policy

With this project as a backdrop I would like now to raise some issues about values in the intended curriculum. Current development policies in many national programs focus on improving the achievement outcomes of students, and although their statements of intent often mention the encouragement of "desirable" values, the curriculum prescriptions which follow have little to say about their development. For example, the Goals of the Australian school mathematics curriculum include the following (Australian Education Council, 1991):

> As a result of learning mathematics in school all students should:
>
> • realise that mathematics is relevant to them personally and to their community;
>
> • gain pleasure from mathematics and appreciate its fascination and power;
>
> • appreciate:
>
> - that mathematics is a dynamic field with its roots in many cultures; and
>
> - its relationship to social and technological change.

It is clear from these statements, which are typical of educational goal statements, that firstly, valuing has entered into their policy choice, and much negotiating would have gone on between interested parties before reaching this state. Secondly, they all contain implications for values teaching and for cultivating what we might term "mathematically informed valuing."

However, even if these statements did allow room for professional teachers to make sensible choices, the intended curricular descriptions which followed were devoid of any indications of how to implement those values, for example by using values-clarification activities, by choosing contentious topics, or by encouraging teachers to stimulate choice or critique, or controversy. We can certainly assume from the perspective of our project that, at the implemented level, the teaching of values inevitably affects the achievement of curricular outcomes. Perhaps those with responsibility for developing state and national (intended) mathematics curricula should also be more concerned about the poor state of knowledge about the values that they are hoping, and intending, will be taught in and through mathematics.

National and state bureaucrats are not the only people ignoring this area. As we start the new century it is interesting to see the variety of proposals and ideas for improving mathematics teaching being generated, see for example, the areas of information technology (Noss & Hoyles, 1996), ethnomathematics (Barton, 1996), and critical mathematics education (Skovsmose, 1994). In all these areas the role of mathematics teachers is being examined, and what is of special interest here is that there is a strong concern both to question, and also to try to change, the values currently being taught.

Also in the International Handbook on Mathematics Education (Bishop, Clements, Keitel, Kilpatrick and Laborde, 1996) more generally, although there is no specific chapter on values, several of the chapters clearly refer to value aspects of mathematics education, and stress their importance. Skovsmose and Nielsen's (1996) chapter is perhaps the one which most nearly addresses values and mathematics education, although they too fall short of mentioning them explicitly, when they argue that "Critical mathematics education is concerned with the development of citizens who are able to take part in discussions and are able to make their own decisions. We therefore have to take into consideration the fact that students will also want, and should be given the opportunity, to 'evaluate' what happens in the classroom. This turns the focus on students' interest." (p1267)

This comment echoes the idea that for values education to develop there is a necessity to ensure that the mathematics classroom is a place of choices, and of choosing, for the students. Teachers could, and in my view should, be presenting students with activities which encourage them to make choices; for example, about the selection of problems to be solved; about the solution approaches to be taken; about the criteria for judging the worth of solutions; and about the wider appropriateness of the mathematical models being taught.

So values teaching is being shaped and perhaps controlled in mathematics classrooms almost by default. One can ask, for example, do textbooks have explicit values-focussed exercises or activities? Seah (1999) analysed textbooks from Singapore and Victoria, Australia, and concluded that textbooks certainly do portray different values, even though they do this implicitly rather than explicitly in the main. They are therefore an important source for focusing and developing values teaching and students' values learning and development. Once again however, without any explicit discussion and decision-making about the values portrayed by textbook texts and activities, those values will be implicitly learnt by default.

A further barrier to progress is that not only is there little explicit values teaching in mathematics classrooms, but also as we have seen from the 1996 International Handbook, there is little explicit addressing of values in the general discourse about mathematics education. Why is this the case? Why do we, as mathematics educators, know so little about values in this context? Is it because much teaching of values is done by modelling, by imitation, and by other implicit rather than explicit methods which we fail to see? If so we have been guilty of a gross oversight. Could it be that it is our oversight which has continued to feed the myth that mathematics is value-free, which in its turn has been a powerful way of protecting the values of exclusivity and 'gate-keeping' which it currently does seem to convey?

Conclusion: the need for policy/practice research

In this paper I have presented some ideas from our research project on values education, and I have outlined some of the possible reasons for the general ignoring of values teaching in the mathematics classroom. However I would

like to finish by pointing to one major gap that I see in our field at present that is implied in part by the research described in this paper.

I believe we need to develop more research of the kind that can best be described as policy studies in mathematics education, that is studies that focus on the determination of policy, and on the nature of policy/practice relationships in mathematics education, in areas such as curriculum, assessment, teacher education, technological developments etc.. Whilst there is much research in relation to the psychology, history, social and cultural studies, and pedagogy of mathematics education, for example, we lack studies in the area of mathematics education policy and practice. Moreover, with the increasing politicisation of education and the growth of government funded and commissioned mathematics educational research, and international comparisons such as the Third International Mathematics and Science Study (TIMSS), it is becoming clear that mathematics education research is interacting a little more than in the past with governmental and administrative agencies at the international, national, regional and local levels. These interactions need to be studied.

Within the mathematics education community itself there are also important movements and conferences such as the Political Dimension of Mathematics Education (PDME), and Mathematics, Education and Society (MES), where the main agendas are often fuelled by dissatisfactions with governmental policies. However there is currently no journal addressing the interactions between governmental/administration practitioners and mathematics education researchers, little overt research or writing in this area, and no international conferences devoted to this area. The result is little dialogue the between professional groups, but much frustration, ignorance and name-calling. The current acrimonious 'debate' about mathematics standards in the USA is but one example.

Perhaps members of the PDME and MES communities, which never shirk from taking strong positions on social justice and democratizing values, could take a lead in developing research agendas, and strategies, in the policy/practice area which could explore overtly sensitive and controversial issues in mathematics education. Values education in mathematics is but one example of a research development that could seriously alter the prospects for changing the current ethos of mathematics education.

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